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Anaconda Nevada Moly Project

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VEGETATION TECHNICAL REPORT

Support Document for the

Draft Environmental Impact Statement

Anaconda Nevada Moly Project

Lead Agency

U.S. Department of the Interior
Bureau of Land Management
Nevada State Office
P. O. Box 12000
Reno, Nevada 89520

Prepared by

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PREFACE

The Anaconda Copper Company of Denver, Colorado, plans to develop an open pit molybdenum mine and flotation mill plant on privately owned land and public land on which the company has located mining claims under the general mining laws, approximately 18 miles north of the town of Tonopah, located in Nye County, Nevada. In order to supply power to the Anaconda project, Sierra Pacific Power Company of Reno, Nevada, has filed with the U.S. Bureau of Land Management (BLM) an application for a right-of-way to construct and operate a 230kV electric transmission line which would cross 86 miles of public land in the Big Smoky Valley in Nye and Lander Counties. Sierra Pacific's right-of-way application initiated BLM's environmental analysis process and the decision was made to prepare an Environmental Impact Statement (EIS) on the proposed transmission line and the Anaconda mine/mill complex. The EIS is being prepared on a contract basis by Environmental Research & Technology, Inc. (ERT), of Fort Collins, Colorado.

This report was prepared by ERT as a preliminary step in the EIS preparation process. The report provides detailed information on the vegetation resources of potentially affected areas and discusses the impacts of the proposed project on these resources.

The vegetation report is one of a series of ten technical reports prepared by ERT as background and documentary material for the EIS. Each report presents the results of field and literature studies in the affected environments and results of impact analyses. The technical reports are intended as background documents and information in them is, in many cases, considerably more detailed than will be included in the EIS.

Chapter 1, "Alternatives Including the Proposed Action", can be found in the Draft Environmental Impact Statement which is on file with copies of the technical reports at the following locations: BLM offices in Washington, D.C.; Reno; Battle Mountain; Carson City; Elko; Ely; Las Vegas; and Winnemucca, Nevada. The following public libraries will also receive copies: the Churchill Public Library, Fallon; Clark County Library, Las Vegas; the Elko County Library, Elko; the Esmeralda County Library, Eureka; the Lander County Library, Battle Mountain; the Mineral County Library, Hawthorne; the Nevada State Library, Carson City; the Nye County Library, Tonopah; the Washoe County Library, Reno; and the White Pine County Library, Ely. Draft EISs will also be sent to the University of Nevada Libraries in Reno and Las Vegas.

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CHAPTER 1

ALTERNATIVES INCLUDING THE PROPOSED ACTION

(Refer to the Draft Environmental Impact Statement)

CHAPTER 2
AFFECTED ENVIRONMENT

INTRODUCTION

This section describes existing baseline conditions for vegetation communities associated with the proposed mine/mill complex and transmission line. Evaluation of these conditions is based on field surveys conducted during 1978 and 1979, review of literature, and agency contacts and data.

REGIONAL OVERVIEW

The Big Smoky Valley lies within the southern portion of the Central Great Basin Province (Cronquist et al. 1972), a large and diverse area characterized by elevated valleys generally over 5,000 feet in altitude. Topography of the basin is one of north-south trending mountains alternating with broad valleys. Mountains are mostly sandstone, siltstone, and shales uplifted by volcanic activity. Valleys are characteristically wide and flat. Annual precipitation averages less than 6 inches in the valleys and 20 inches or more in the mountains, with the majority falling between October and May. Severe July and August thundershowers usually result in rapid run-off which is unavailable to plants.

The Big Smoky Valley lies in the Saltbush-Greasewood vegetation type delineated by Kuchler (1975). This community is widespread in the valleys and basins between mountain ranges in western Nevada. On a more local scale, vegetation types on the mine/mill complex correspond to the Shadscale type (basin floors) and the Black Sagebrush type (shallow soils of mountains, mesas, and foothills) of Beatley (1976). These communities are used for livestock range.

MINE/MILL COMPLEX

Vegetation Types

Two major vegetation types occur on the mine/mill complex. The Saltbush-Black Sagebrush type occupies the Pintwater Rock Outcrop with gravelly sandy loam, a shallow soil that overlies bedrock on the San Antonio Mountain slopes. The Galleta-Saltbush type occupies the Bluewing gravelly loam, Koyen loamy sand, and Stumble sand series on the alluvial fans that extend outward from the base of the mountains. There is a distinct boundary between the two vegetation types along the mountain slope-alluvium boundary.

Average ground cover was estimated to be 22 percent in the Saltbush-Black Sagebrush type. Approximately 16 percent was provided by eleven species of shrubs and 6 percent by twelve species of grasses and forbs (Appendix B).

Black sagebrush and shadscale were the dominant shrub species, together contributing over 75 percent of the shrub stratum ground cover. Greatest density/acre (951) was also estimated for these two species. Density/acre of all shrub species was estimated to be 1,689. Black sagebrush occurred primarily on the north- and east-facing slopes; shadscale occurred primarily on west- and south-facing slopes. Other important shrub species in this type were broom snakeweed and greasewood.

Cheatgrass and galleta were the predominant herbaceous species sampled, together contributing over 65 percent of the herbaceous stratum cover. The prevalence of cheatgrass is attributed to past disturbance of the ore body area by mining and drilling machinery. The noxious weed halogeton was found only along road cuts.

Soils in this type were extremely shallow (less than 6 inches) and rocky above the rhyolite bedrock. Slopes were steep (average slope in quadrats sampled was estimated to be 10 degrees). Pedestalled shrubs encountered along this transect indicate that erosion is actively occurring. Litter consisted primarily of dead shrubs and mats of annual species.

Average ground cover was estimated to be 25 percent in the Galleta-Saltbush type. Ten percent was provided by eight species of shrubs, and 15 percent by nine species of grasses and forbs (Appendix C).

Greasewood was the dominant shrub species, contributing nearly 50 percent of the shrub stratum cover, and occurring in nearly 50 percent of the quadrats sampled. Greasewood shrubs were short (less than 1 meter tall). Other important shrub species were shadscale and gray horsebrush. Density per acre of all shrub species was estimated to be 1,144, slightly less than the adjacent Saltbush-Black Sagebrush type.

Galleta was the dominant herbaceous species, occurring in 70 percent of the quadrats sampled, and providing nearly 14 percent ground cover. All other herbaceous species were of minor importance. Galleta was most abundant on sandy soils. Almost no litter was recorded. Slope was estimated to be one degree or less, and little evidence of erosion was observed. No evidence of summer grazing by livestock was observed.

Flora

A total of 64 plant species were encountered on field surveys of the mine/mill complex and adjacent areas. Of the total, 18 were shrubs, 20 were grasses, and 26 were forbs (Appendix D).

No plant species from Nevada are presently listed by the U.S. Fish and Wildlife Service (FWS) as threatened or endangered. However, a number of taxa are considered candidate species by the FWS. Such species are being reviewed for future consideration for proposal to the federal threatened and endangered species list. Twenty such candidates (Table 2-1)
occur in the project vicinity (FWS 1980). Their collection locations have been recorded on topographic maps. These maps are available from the Northern Nevada Native Plant Society, Nevada State Museum, Carson City, Nevada (Pinzl, personal communiction 1979). These plants are not presently afforded protection by the FWS or the State of Nevada, but may gain official status as a result of the review process. The BLM treats candidate species that occur on public lands as if they were officially listed as threatened or endangered.

Eleven of the 20 candidate species may occur in vegetation types to be disturbed by the proposed project activities. These species and general descriptions of their habitats are present in Table 2-2. Known locations for only two of the eleven coincide closely with areas of project activity (Map 2-1). Prickly pear (*Opuntia pulchella* var. *rosea*) has been collected near the West Smoky Valley alternate transmission line corridor. A plant believed to be fishhook cactus (*Sclerocactus polyancistrus*) was found along Liberty Springs Road (T5N R42E S16) during the field survey. The plant was not collected or photographed. Identification was based on spine characters and geographic range

TABLE 2-1

TWENTY PLANT SPECIES BEING REVIEWED BY THE FWS FOR POTENTIAL CONSIDERATION FOR PROPOSAL TO THE FEDERAL THREATENED AND ENDANGERED SPECIES LIST

Species	Current Status
Asclepias eastwoodiana	CT[1/]
Astragalus callithix	CT
Astragalus funereus	CT
Astragalus pseudiodanthus	CT
Astragalus serenoi var. sordescens	CT
Astragalus toquimanus	CT
Astragalus uncialis	CE[2/]
Coryphantha vivipara var. rosea	CT
Cryptantha hoffmannii	CT
Draba arida	SC[3/]
Frasera pahutensis	CT
Lewisia maguirei	CE
Machaeranthera leucanthemifolia	SC
Mertensia toiyabensis	SC
Opuntia pulchella	SC
Penstemon arenarius	CT
Penstemon pudicus	CT
Sclerocactus polyancistrus	CT
Sphaeralcea caespitosa	CT
Trifolium andersonii ssp. beatleyai	SC

[1/] Candidate threatened

[2/] Candidate endangered

[3/] Special concern

Source: U.S.D.I., Fish and Wildlife Service. January 1980. Letter from W. Meyer, Acting Regulations Director, Portland, Oregon, to District Manager, Bureau of Land Management, Battle Mountain, Nevada regarding Endangered Species Act responsibilities.

TABLE 2-2

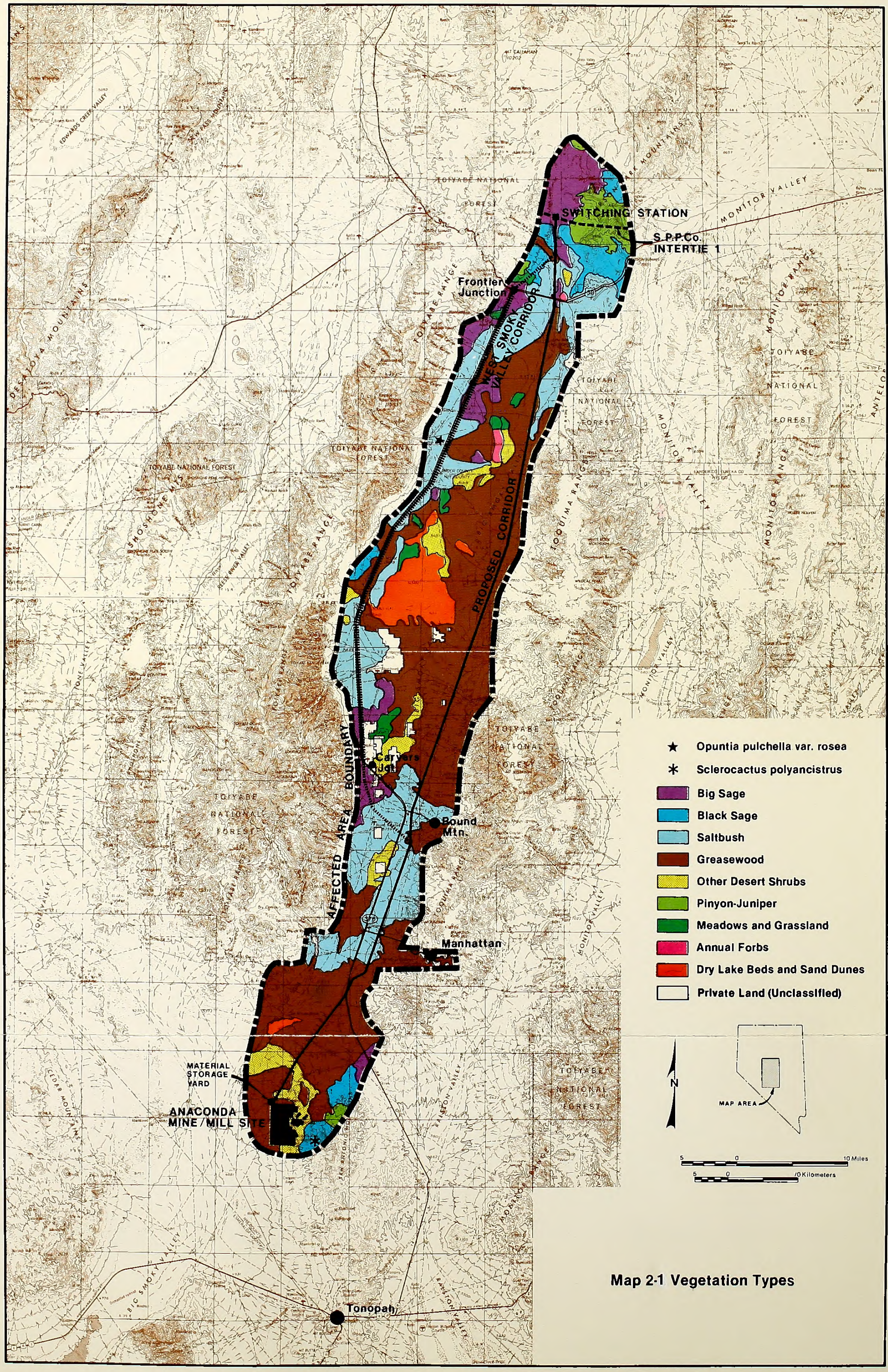
LIST OF CANDIDATE THREATENED AND ENDANGERED PLANT SPECIES THAT POTENTIALLY OCCUR ON THE NEVADA MOLY MINE/MILL COMPLEX OR TRANSMISSION LINE CORRIDORS

Asclepias eastwoodiana	Low alkaline clay hills and rocky slopes of pinyon pine; red sand. Central Nevada (Nye and Lander counties) and Utah.[1]
Astragalus callithrix	Semi-stabilized dunes or deep sandy soil in sagebrush valleys; 5,100-5,200 feet; known only from a small area between Quinn Canyon and Hot Creek Ranges, northeast Nye County.
Astragalus pseudiodanthus	Dunes and sandy flats, often with Bailey greasewood and galleta; at 5,500 feet; in vicinity of Tonopah, west and northwest of Nye County, Nevada.[2]
Astragalus serenoi var. *sordescens*	Gentle slopes and flats among low sage; north-central Nye County; pinyon-juniper zone with *Artemisia nova*; dry desert soil, level slopes.[3]
Astragalus uncialis	Dry knolls and gullies, in sandy or gravelly alkaline soils derived from pulverized limestones; 5,200-6,050 feet; known only from foothills of White Pine and Pancake Ranges, northeast Nye County.[2]
Coryphantha vivipara var. *rosea*	Sandy soil.[4]
Machaeranthera leucanthemifolia	Disturbed burns, washes; brush communities; gravelly soil; outwashes; deep gullies; 2,100-8,500 feet.[3]
Opuntia pulchella	Alluvial bottoms at moderate elevations.[5]
Penstemon arenarius	Loose sand; approximately 28 miles east of Tonopah.[6]

TABLE 2-2 (CONTINUED)

Sclerocactus polyancistrus	Chiefly on mesas, deserts of Nevada and California.[3]
Sphaeralcea caespitosa	Gravelly sandy soil, with shadscale; shallow soil, mixed desert shrub habitat; shallow, sandy or gravelly gentle slopes; level land and slight draws.[3]

[1]Woodson, E. 1954. North American species of Asclepias. Annals of the Missouri Botanical Garden 41:165-166.
[2]Barneby, R. C. 1964. Atlas of North American Astragalus. Volumes I and II. Memoirs of the New York Botanical Garden. 1188 pp.
[3]Pinzl, A. September 1979 and February 1980. Curator, Nevada State Museum. Personal communication.
[4]Britton, N. L. and J. N. Rose. 1922. The Cactaceae. Volume IV. Dover Publications, Inc., New York. 318 pp.
[5]Benson, L. 1950. The Cacti of Arizona. University of Arizona Press, Tucson. 135 pp.
[6]Keck, D. 1940. Studies in Penstemon VII. American Midland Naturalist 23(3):594-616.
[7]Britton, N. L. and J. N. Rose. 1922. The Cactaceae. Volume 3. Dover Publications, Inc., New York. 258 pp.



Map 2-1 Vegetation Types

(Benson 1966), as flowers were not present. Fishhook cactus is known from similar habitats just south of Tonopah (Nevada State Museum 1978) and may be expected to occur farther north in the mine pit area. However, it was not seen here during the field survey. The remaining nine species potentially occur in or near the project area, but were not encountered during field surveys.

Nine of the 20 candidate species do not occur in vegetation types to be affected by the proposed project activities. All are known to occur only in the pinyon-juniper type (Appendix E), which within the project site boundaries, is restricted to the upper elevations of the Toiyabe and Toquima Ranges.

Range Utilization

The mine/mill complex area is currently used for cattle range. Cattle graze the area primarily in the spring and fall. The project area is adjacent to the San Antone allotment. The Bureau of Land Management (BLM) shows the carrying capacities of the San Antone grazing unit as follows:

o Public acreage	440,826 acres
o Available vegetation	11,482 Animal Unit Months (AUMs)
o Five-year livestock use	10,515 AUMs
o Existing mule deer use	494 AUMs

Carrying capacity is low (approximately 38 acres/AUM) because of the sparse vegetative cover and infrequent rainfall in this region.

PROPOSED AND ALTERNATE ROUTE FOR 230KV TRANSMISSION LINE

Both the proposed and alternate transmission line routings would be located in the Big Smoky Valley, which lies on a north-to-south line from east of Austin in Lander County south to the proposed mine/mill complex northwest of Tonopah in Nye County. The valley ranges from 5 to 8 miles wide, and is generally flat.

Vegetation Types

Dominant vegetation types in the vicinity of the proposed transmission line corridors are Big Sagebrush, Black Sagebrush, Shadscale, Black Greasewood, Grassland, and Other Desert Shrub (U.S.D.I., Bureau of Land Management n.d.). Vegetation types crossed by the proposed and alternate transmission line routes are shown in Map 2-1 and the number of miles crossed in each type are summarized in Table 2-3.

The Big Sagebrush type is crossed by 2 miles of the proposed and 17 miles of the alternate transmission line corridors. Big sagebrush is most extensive on deep, permeable, salt-free soils that are well drained. Associated species include black sagebrush, Nevada ephedra, rabbitbrush, western wheatgrass, Indian ricegrass, and several forb species.

TABLE 2-3

SUMMARY OF VEGETATION TYPES CROSSED BY PROPOSED AND ALTERNATE TRANSMISSION LINE ROUTES

	Proposed Corridor		Alternative Corridor	
Vegetation Type	Miles Crossed	Acreage[a/]	Miles Crossed	Acreage[a/]
Greasewood	59	1,001	23	390
Big Sagebrush	2	34	17	288
Black Sagebrush	2	34	5	85
Shadscale	21	356	42	713
Other Desert Shrub	2	34	2	34
Grassland	--	--	2	34
	86	1,459	91	1,544

[a/] 140-foot right-of-way. The entire right-of-way would not be disturbed.

The Black Sagebrush type is crossed by 2 miles of the proposed and 5 miles of the alternate transmission line routes. Black sagebrush frequently grows on gravelly loams and rock outcrops on mountain slopes. Associated species include Sandberg bluegrass, Indian ricegrass, and needle-and-thread.

The Shadscale type is crossed by 21 miles of the proposed and 42 miles of the alternate transmission line routes. This type occurs on slightly more saline soils than Big Sagebrush. Common species include summer cypress, saltbush, galleta, Indian ricegrass, wild buckwheat, and several annual forb species.

Black Greasewood is the most extensive salt-tolerant community in the Intermountain Region. The Black Greasewood type is crossed by 59 miles of the proposed route, and by 23 miles of the alternate route. This type occurs on saline clays of valley bottoms and playas. Saltbush species, halogeton, Russian thistle, saltgrass, and alkali sacaton are common associates in this type.

The remaining vegetation types are minor in extent.

Flora

A detailed species list is not available for the Big Smoky Valley. Known locations in the Big Smoky Valley for two candidate species (being reviewed for consideration for proposal to the federal threatened and endangered species list) are presented on Map 2-1. A collection location for one of these, prickly pear, coincides with the alternate transmission line route (Map 2-1). Habitats for these and nine additional candidate species of potential occurrence in the proposed areas of project activity are summarized in Table 2-2. Nine other candidate species are known to occur only in the pinyon-juniper vegetation type (Appendix E). Although within the project site boundaries, this type will not be disturbed by project activities.

Range Utilization

Livestock graze in the Big Smoky Valley and surrounding mountain ranges. Table 2-4 summarizes the sizes and stocking rates of major allotments in the Big Smoky Valley. Based on division of total allotment acres by the total animal unit months for allotments, approximately 27 acres are required per animal unit month.

TABLE 2-4

ALLOTMENT SIZES AND STOCKING RATES FOR THE BIG SMOKY VALLEY, NYE AND LANDER COUNTIES, NEVADA

Allotment	Number of Public Acres	Available Vegetation (AUMs)
Smoky	126,976	6,483
Francisco	16,896	1,114
San Antone	440,826	11,482
Trail Canyon	24,563	509
Wildcat Canyon	61,810	1,929
Kingston Canyon	77,530	2,728
Simpson Park	97,945	6,042
Neilson Individual	540	116
Millet Ranch Individual	1,100	72
Vigus Field	1,340	620
TOTAL	849,526	31,095

Source: Deschamp, personal communication 1979.

CHAPTER 3
ENVIRONMENTAL CONSEQUENCES

ASSUMPTIONS AND ANALYSIS GUIDELINES

The primary effect of construction and operation of the mine/mill complex and the associated transmission line would be the removal of vegetation. The impacts related to vegetation removal include reduction in livestock and wildlife carrying capacity, potential loss of threatened or endangered plant species, and increased potential for soil erosion. The majority of this discussion is oriented toward quantifying the impacts resulting from vegetation removal on vegetation community vigor and diversity, livestock forage, and rare plants. The impacts on wildlife and soils are discussed in separate technical reports.

Assumptions Regarding the Proposed Action and Alternatives

The following assumptions were used in this impact assessment:

1. It was assumed that the Proposed Action and alternatives would be implemented as described in Chapter 1. Design specification, facilities, emission rates, employment levels, and similar parameters would be as described. Standard operating procedures at the mine/mill complex and committed mitigation measures for the 230kv transmission line would be enforced and adequately implemented. A detailed revegetation plan would be developed and implemented at the mine/mill site. The revegetation plan would be consistent with the guidelines presented in Appendix A of the Soils Technical Report (also see DEIS).

2. Preliminary laboratory analyses of water quality indicate that no significant levels of pollutants would be present in the standing water of the tailings pond. As a consequence no potentially toxic materials would affect the root zones of plants surrounding the tailings pond.

3. Measures of dust control, as discussed in Chapter 1, would be sufficient to assure that vegetation growth would not be negatively affected by dust emissions.

4. It was assumed that the drainage zone included in the design of the tailings dam would function effectively in limiting horizontal movement of tailings liquid. As such, it was assumed that tailings liquids would not affect the root zones of vegetation outside the tailings embankment.

5. Combustion emission from mill operation would not exceed state or federal standards. Therefore, it is unlikely that pollutant damage to vegetation would occur.

6. Areas used for project components would eventually be abandoned and reclaimed. Anaconda is committed to implementing an effective revegetation program as mentioned in Chapter 1; therefore, it is assumed that the procedures recommended for

rehabilitation would be employed during the life of the project and after abandonment. As a consequence, vegetation resource losses would be considered temporary (20 to 50 years). A loss period of 30 years is assumed in this analysis (20-year life of project plus 10-year rehabilitation period).

7. The site potential for vegetation growth would not change significantly between current conditions and the site conditions expected after completion of the project. This assumption includes, at a minimum, an adequate cover of topsoil, and gentle slopes for waste disposal piles. It is assumed that the mine pit would not be reclaimed, and represents a permanent vegetation resource loss. This loss may be offset by enhanced productivity on topsoiled and reclaimed waste rock piles north of the pit, where current vegetation productivity is sparse because of shallow soils over bedrock. Site potential for productive forage could be negatively affected by the invasion by undesirable weeds, especially halogeton, a serious weed known to occur on the mine area. However, a weed control program would be implemented as a part of the reclamation plan.

8. It was assumed that permanent area losses at the mine/mill complex would be limited to the 456-acre mine pit. All other areas (2,484 acres) would eventually be abandoned and subjected to reclamation efforts. For comparison purposes, it was assumed that all acreage for the mine/mill complex would be removed from use in the first year of the project and would not be subject to rehabilitation efforts until after mine/mill closure.

9. Based on the discussion of impact to soils in the Soils Technical Report, there is some uncertainty regarding the potential for successful revegetation of the tailings dam, tailings pond and waste disposal areas of the mine/mill complex. Consequently, worst-case analysis was warranted and the assumption was made that successful revegetation of these areas would not occur. Total permanent habitat losses at the mine/mill complex are considered to be 2,521 acres under the worst-case analysis. Temporary losses would total 419 acres.

10. Estimates of carrying capacity by allotment are adequate for estimating AUM reductions resulting from rangeland reductions caused by implementing the project. It is recognized that different vegetation types of varying extent compose each allotment. It is assumed that the average allotment carrying capacity for the San Antone allotment is representative of the available forage on the mine/mill complex and that the average carrying capacity of all allotments in the Big Smoky Valley and surrounding mountains is representative of the forage production in the vicinity of the transmission line. Carrying capacity estimates are 38 acres/AUM for the mine/mill complex, and 27 acres/AUM for the Big Smoky Valley transmission line corridor.

11. Rangeland losses are in a one-to-one correspondence with acreage disturbed. It is probable that actual displacement of livestock would involve a larger area because access roads may restrict movement of animals from one side of the mine/ mill complex to the other. The proposed transmission line is not expected to have any restrictive effect on livestock movement. For purposes of comparison it is assumed that all acreage for the mine/mill complex would be removed from use in the first year of the project, and would not be available for 30 years.

12. It was assumed that actual disturbance within the transmission line corridors would be limited to an 8-foot wide access trail running the length of the line; an 800 square-foot area at each tower site; 3 acres for a materials storage yard on ACC property; and 4 acres for the switching station. Although no permanent access road would be constructed, the future extent of use of the access trail is unknown and was therefore considered a permanent disturbance. Other permanent disturbances associated with the transmission line include 4 acres of the switching station. Disturbances for tower construction and for the materials storage yard were assumed to be temporary.

The following assumptions were used to develop revegetation guidelines and mitigation measures:

1. Revegetation procedures would be developed expanding on guidelines given in Appendix A. Anaconda would implement the following procedures during reclamation for the project.

   - Disturbed areas outside the pit perimeter would be recontoured to blend with the existing topography to the extent possible. Coarse cover material would be used to control fugitive dust. Following mine closure, ACC would attempt to revegetate the areas involved, utilizing the results of experimental determinations that would be carried out over the course of the mine life.

   - Materials used for outer layers in constructing the tailings embankment would be used in experimental plots to evaluate revegetation procedures.

   - Inactive areas of the tailings pond surface would be used for test plots to evaluate revegetation procedures for the tailings material.

2. As noted in Chapter 2, eleven plant species which are candidates for the Federal threatened and endangered species list potentially occur in the Big Smoky Valley. These species are not currently protected by state or Federal law. One such species, the fishhook cactus (Sclerocactus polyancistrus), was found near the mine/mill site during field investigations. Prior to disturbance, ACC will complete a survey of the mine/ mill site to determine actual occurrence of this or other candidate species on site. If any plants are found in areas to be disturbed, they will be transplanted to adjacent areas

of suitable habitat, if feasible, or donated to one of several regional botanical gardens. Such action would be in compliance with state and Federal law.

3. Clearing of the disturbed area would be kept to the least amount possible. Vegetation cover would not be removed from any area unless necessary for construction and approved by BLM. Hand clearing would be used in areas where the use of heavy equipment would be detrimental to existing conditions.

4. All construction access would be reviewed and approved prior to construction with existing roads and trails used wherever possible. All travel would be limited to specified overland routes unless existing roads and trails are available for use. Natural grass and low brush would not be routinely removed. Only brush blade and back-blade techniques would be used in such areas to remove surface rock.

5. Public land areas used for temporary access roads, equipment storage, and other construction activities would be restored to their natural state insofar as practicable and in accordance with a restoration plan approved by BLM.

6. Revegetation would be required in areas identified by BLM on the date specified. Practice has shown that late fall is most successful, so in many instances fall seeding would be required. This would usually be accomplished during September, October, and November. Scarification of compacted areas and seeding of disturbed areas would occur after notification by BLM.

7. The seed mix used in revegetation would be determined by BLM and would be provided and applied in accordance with specific instructions and techniques as prescribed by BLM. All seed used would meet all requirements of the Federal Seed Act (7 USC 1551-1610, inclusive) and the seed laws and noxious weed laws of Nevada. Evidence of seed certification would be furnished by the applicant at the request of BLM. All leguminous seed would be inoculated with approved cultures in accordance with manufacturer's instructions.

8. During revegetation, seed, fertilizer, and mulch would be applied uniformly on the designated areas as specified by BLM. No seed, fertilizer, or mulch would be applied when wind velocities would prevent uniform application of the material on the designated areas.

9. Mulch would be utilized where necessary to achieve revegetation, as specified by BLM, and would consist of straw, hay, or specially prepared wood cellulose fiber processed in such a manner that it contains no growth or germination inhibiting factors and would be free of noxious weed seed.

10. Whenever revegetation is required, a notice would be filed with BLM when such planting is complete. The notice would contain information regarding location of the area, type of planting or seeding (including mixtures and amounts), date of planting, and other relevant information as may be required by BLM.

11. Inspection and evaluation of revegetation measures taken would be made by BLM after completion of the first growing season with further evaluation during the following growing season. If rehabilitation measures as listed above fail to become established in two growing seasons due to inadequate reseeding techniques or drought conditions, the applicant would be required to reseed the previously treated area. At the end of the two-year period following the second seeding, the applicant would be relieved of further responsibility.

12. It is BLM policy to protect and conserve species which are candidates for the list of threatened and endangered species as if they were on the list. Accordingly, a survey of the selected transmission line route would be conducted prior to construction to determine the actual occurrence of eleven candidate plant species which potentially occur in the Big Smoky Valley. If any of these plants are found, appropriate measures would be implemented to prevent their disturbance.

EFFECTS OF IMPLEMENTING THE PROPOSED ACTION

Mine/Mill Complex

Impacts

Temporary and permanent losses of rangeland would result from this project. These losses would result in displacement of wildlife and livestock onto adjacent rangeland where utilization above current levels may occur. Livestock reductions may be required proportionate to rangeland losses associated with the project. It is estimated that under worst-case conditions, the entire mine/mill complex would cause the permanent loss of 2,521 acres, (66 AUMs per year) and the temporary removal of 419 acres (11 AUMs over a 30 year period).

Under a worst-case analysis, disturbance of vegetation at the mine/mill complex would harm fishhook cactus (*Sclerocactus polyancistrus*) and other candidate threatened and endangered species described in Chapter 2. This conclusion is based on the potential occurrence of the species on the mine/mill complex site. Although their actual presence here is unknown, the worst-case analysis assumes that these species would occur on the site and that they would be disturbed by project activities.

Proposed 230 kV Transmission Line

Total land required for the proposed 230kV transmission line route in the Big Smoky Valley is 1,459 acres. About 98 acres of this land would be impacted by construction activities; 87 acres would be permanently removed by construction of permanent structures and roads while

11 acres would be temporarily disturbed during construction. The remaining 1,361 acres lie within the 140-foot-wide right-of-way and would not be impacted by project activities.

Impacts

Construction of the proposed transmission line would result in the permanent removal of 87 acres of usable rangeland. Sixty-eight percent of this is Greasewood, 24 percent is Shadscale, and Big Sagebrush, Black Sagebrush, and Other Desert Shrubs each comprise 2 percent. This represents an estimated permanent loss of 3.2 Animal Unit Months (AUMs) per year. Three acres of the Big Sagebrush vegetation type would be removed from productivity as a result of the construction of a switching station at the north end of the line on existing Sierra Pacific Power Company Intertie No. 1. Removal of these acres would result in the loss of 0.1 AUM/year. Vegetation from the remaining 84 acres (3.2 AUMs/year) would be permanently removed as a result of the establishment of an 8-foot-wide dirt access road which would run the entire length of the transmission line.

A total of 10 acres would be temporarily impacted (five years) as a result of pole installation and the establishment of one materials storage yard on Anaconda property. The consequent temporary loss of productivity would be 2.2 AUMs. The materials storage yard area would be created by simply clearing the desired area of brush.

Erosion as a result of removal of vegetation would be very local because the disturbance would be spread out over 86 miles. The small areas to be disturbed would be surrounded by native vegetation which would reduce the wind erosion losses.

Under a worst-case analysis, disturbance of vegetation along the transmission corridor route would harm the eleven threatened or endangered candidate species discussed in Chapter 2. This conclusion is based on the potential occurrence of the species within the corridor right-of-way. Although only one of the eleven species, prickly pear (Opuntia pulchella), has been documented to occur in the vicinity of the corridor, the worst-case analysis assumes that all of the species would occur in the corridor and would be disturbed by project activities. A field survey of the proposed route prior to project initiation would serve to locate those species of concern so that mitigative measures may be implemented prior to construction.

EFFECTS OF IMPLEMENTING ALTERNATIVE 1, WEST SMOKY VALLEY TRANSMISSION CORRIDOR

Construction of the transmission line in the West Smoky Valley alternative corridor would result in vegetation disturbance similar to that for the proposed transmission line. Impacts associated with the permanent loss of vegetative productivity on 92 acres (over 91 miles) and temporary loss on 11 acres would be insignificant because of the low productivity of the land (27 acres per AUM) and the comparitively small area affected. Mitigation measures in Chapter 1 regarding candidate threatened and endangered plants would preclude adverse impacts to these important species.

EFFECTS OF IMPLEMENTING ALTERNATIVES 2 AND 3, ALTERNATE TOWER STRUCTURES AND ALTERNATIVE CRUSHING/GRINDING CIRCUIT FOR THE MINE/MILL COMPLEX

The vegetation resources would be affected in the same ways that they would be by implementation of the proposed action.

EFFECTS OF IMPLEMENTING ALTERNATIVE 2, NO ACTION

If no transmission line were constructed to the mine/mill complex, it is not known what plans would be undertaken. The possibility exists that Anaconda would initiate a program of self-generation and the mine/mill complex would be developed as described in Chapter 1.

Impacts

In the No Action situation, those impacts related to the transmission line would not occur. Impacts associated with the mine/mill complex would be the same as the proposed action. It is assumed that the generating facilities and storage tanks would be probably less than 50 acres. It is assumed that impacts to vegetation associated with self-generation would be insignificant.

THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The short-term use of the proposed project would remove an insignificant portion of the available regional rangeland base in the long term. Vegetation from 2,521 acres at the mine/mill complex and 87 acres of transmission line would be permanently removed from production; this would represent a long-term loss. The long-term productivity of the vegetation in the Big Smoky Valley would not be significantly changed by the project. Construction of the mine/mill complex could result in disturbance of candidate threatened and endangered plants. If this did result, the loss or removal of the plants from their natural habitat would represent a significant long-term impact.

The mine/mill complex would result in the long-term loss of 66 AUMs per year, assuming the worst-case. The transmission line would result in the long-term loss of 3.2 AUMs per year. Neither of these losses would significantly affect the long-term productivity of Nye County or the Big Smoky Valley.

Approximately 3,204 acres of land would be changed from open space and grazing uses to primarily residential and industrial uses. In the long-term, approximately 419 acres would be returned to open space and grazing; 264 acres would remain in residential and ancillary use; and 2,521 acres would remain as the unreclaimed mine pit, waste disposal areas, and tailings area (assuming worst-case analysis). The project would indirectly double the developed acreage of Tonopah over the long-term.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Construction of project facilities would involve removal of vegetation from 2,940 acres at the mine/mill complex, and 98 acres for the

proposed transmission line. Under worst-case analyses, only 419 acres of the mine/mill complex and 11 acres of the transmission line would be revegetated.

CHAPTER 4

LIST OF PREPARERS

INTRODUCTION

The following individuals had primary responsibility for conducting the technical reports. Their education, project responsibilities, qualifications, and experience are summarized below.

Environmental Research and Technology, Inc.

ELLEN I. COLLINS, Plant Ecologist
M.S. in Botany, Oklahoma State University
B.A. in Biology, Gettysburg College

Anaconda Nevada Moly Project: Responsible for environmental studies of vegetation, threatened and endangered species, and range management for the transmission line phase of the project. Junior author of Vegetation Technical Report.

Experience includes participation in vegetation baseline studies for proposed surface mining projects, pipelines, and transmission lines; conducting surveys for threatened or endangered plant species at proposed surface and underground mine sites and along proposed transmission and pipeline corridors; preparation of vegetation baseline reports, Environmental Assessments and Environmental Impact Statements.

SCOTT L. ELLIS, Plant/Range Ecologist
B.A. in Biology and English,
Cornell University

Anaconda Nevada Moly Project: Responsible for environmental studies of vegetation, threatened and endangered species, and range management. Senior author of Vegetation Technical Report.

Experience includes design and management of vegetation surveys and reclamation plans for proposed surface and underground mining projects and pipelines; development of publication describing threatened and endangered plant species in Colorado for the USDI, Fish and Wildlife Service; design and performance of surveys for threatened and endangered plant species at proposed industrial sites and along proposed transmission/pipeline corridors.

CHAPTER 5

CONSULTATION AND COORDINATION

Consultation and coordination for the vegetation report has included meetings and/or telephone conversations with various federal and state agencies. The following specific activities have taken place as part of this program.

Date	Activity
9/24/79	Meeting with Bureau of Land Management, Nevada State Office, Reno, Nevada
9/24/79	Meeting with Division of Forestry, Department of Conservation and Natural Resources, Carson City, Nevada
9/24/79	Meeting with Nevada State Museum personnel, Carson
9/25/79	Meeting with Bureau of Land Management, Battle Mountain, Nevada
9/26/79	Meeting with Bureau of Land Management, Tonopah, Nevada
9/27/79	Field reconnaissance of preferred and alternative transmission line routes
10/26/79	Conversation with Bureau of Land Management, Battle Mountain, Nevada
10/29/79	Conversation with Nevada State Museum personnel, Carson City, Nevada

Federal Government

U.S. Department of the Interior

- Bureau of Land Management
  - Nevada State Office
  - Battle Mountain District Office
  - Tonopah District Office

State of Nevada

Nevada State Museum

Department of Conservation and Natural Resources

Division of Forestry

CHAPTER 6

APPENDICES

APPENDIX A

METHODOLOGY

MINE/MILL COMPLEX

Field Sampling

Results of a reconnaissance over the study area indicated that there were two primary vegetation types, differentiated by dominant species and by soil characteristics. The Saltbush-Black Sagebrush type occurs on rocky hillsides (the ore body). The Galleta-Saltbush type occurs on sandy-gravelly alluvial outwash fans (tailings disposal site, waste dump).

A 1,000-meter transect was established in each vegetation type. Nested quadrats were placed at 20-meter intervals along this line for a total of 50 sampling points for each type. Canopy cover of all species occurring in a 1-square meter quadrat and density of shrub species in a 4-square meter quadrat were recorded at each 20-meter interval. Litter, cover, aspect, and slope and height range for each shrub species were also recorded.

Data were analyzed to determine average herbaceous and shrub species cover, and average density of shrub species. Percent frequency (number of quadrats in which a species occurred/all quadrats sampled) was calculated for each species. Cover and frequency values were examined to determine the dominant species in each vegetation type.

Plant Collection

Voucher specimens were collected for many of the species encountered on the study area. Special efforts were made to collect plants around Liberty Springs (willow-rush vegetation type) south of the proposed mine area since no quantitative measurements were made in this area. Plants were labeled by location, pressed, and dried.

PROPOSED AND ALTERNATIVE ROUTE FOR 230KV TRANSMISSION LINE

A basically qualitative baseline study was made of the proposed and alternate transmission line routes through Big Smoky Valley from the tie-in point near Austin to Anaconda's property northwest of Tonopah. A literature search and agency contacts were the primary sources of information used in this analysis. When acreages, available vegetation figures, and carrying capacity figures were available, they were used to quantitatively assess impacts of the proposed project.

APPENDIX B

PLANT COMPOSITION AND STRUCTURE OF THE SALTBUSH-BLACK SAGEBRUSH VEGETATION TYPE ON THE ANACONDA MOLYBDENUM PROJECT SITE

	% Ground Cover ($\bar{X}$)	Frequency (%) Shrub: $4m^2$ Quad Herb: $1m^2$ Quad	Shrub Density ($\bar{X}/4m^2$ Quad)	Shrub Density ($\bar{X}$/acre)	Shrub Ht. Range (m)
Shrub					
Artemisia nova	6.50	34	2.08	526	.25-.50
Atriplex confertifolia	5.76	70	1.68	425	.25-.50
Ceratoides lanata	.37	32	1.02	258	.10-.20
Chrysothamnus viscidiflorus	.04	2	.02	5	.10-.25
Ephedra nevadensis	.38	22	.24	61	.25-.75
Grayia spinosa	.10	2	.02	5	.25-.50
Leptodactylon sp.	.08	14	.34	86	.10-.20
Opuntia echinocarpa	--	2	.02	5	.10-.20
Sarcobatus vermiculatus	3.68	12	.46	116	.25-.75

APPENDIX B (continued)

PLANT COMPOSITION AND STRUCTURE OF THE SALTBUSH-BLACK SAGEBRUSH VEGETATION TYPE ON THE ANACONDA MOLYBDENUM PROJECT SITE

	% Ground Cover ($\bar{X}$)	Frequency (%) Shrub: $4m^2$ Quad Herb: $1m^2$ Quad	Shrub Density ($\bar{X}/4m^2$ Quad)	Shrub Density ($\bar{X}$/acre)	Shrub Ht. Range (m)
Shrub (continued)					
Symphoricarpos longiflorus	.70	2	.02	5	.25-.50
Tetradymia canescens	.31	4	.06	15	.25-.50
Xanthocephalum sarothrae	2.66	26	.72	182	.25-.50
Grass					
Blepharidachne kingii	.02	4			
Bromus tectorum	2.20	40			
Hilaria jamesii	1.67	18			
Oryzopsis hymenoides	.07	6			
Poa sandbergii	.06	6			

APPENDIX B (continued)

PLANT COMPOSITION AND STRUCTURE OF THE SALTBUSH-BLACK SAGEBRUSH VEGETATION TYPE ON THE ANACONDA MOLYBDENUM PROJECT SITE

	% Ground Cover ($\bar{X}$)	Frequency (%) Shrub: $4m^2$ Quad Herb: $1m^2$ Quad	Shrub Density ($\bar{X}/4m^2$ Quad)	Shrub Density ($\bar{X}$/acre)	Shrub Ht. Range (m)
Grass (continued)					
Sitanion hystrix	.70	26			
Stipa speciosa	.38	8			
Forb					
Alyssum alyssoides	.08	1			
Eriogonum inflatum	.02	2			
Gilia sp.	.05	6			
Halogeton glomeratus	.48	4			
Salsola kali	.04	2			
Litter	2.14		—	—	
Total	21.99		6.68	1,689	

APPENDIX C

PLANT COMPOSITION AND STRUCTURE OF THE GALLETA-SALTBUSH VEGETATION TYPE ON THE ANACONDA MOLYBDENUM PROJECT SITE

	% Ground Cover ($\bar{X}$)	Frequency (%) Shrub: $4m^2$ Quad Herb: $1m^2$ Quad	Shrub Density ($\bar{X}/4m^2$ Quad)	Shrub Density ($\bar{X}$/acre)	Shrub Ht. Range (m)
Shrub					
Atriplex canescens	--	4	.04	10	.10-.50
Atriplex confertifolia	1.48	20	.42	106	.25-.50
Ceratoides lanata	.06	22	.26	66	.10-.40
Ephedra nevadensis	.72	32	.46	116	.20-1.10
Grayia spinosa	.40	36	.56	142	.50-.80
Leptodactylon sp.	.54	44	.90	228	.10-.20
Sarcobatus vermiculatus	4.70	48	1.24	314	.20-.70
Tetradymia canescens	1.66	16	.26	66	.10-.90
Xanthocephalum sarothrae	.54	16	.38	96	.25-.75
Grass					
Blepharidachne kingii	.15	8			
Hilaria jamesii	13.59	70			

APPENDIX C (continued)

PLANT COMPOSITION AND STRUCTURE OF THE GALLETA-SALTBUSH VEGETATION TYPE ON THE ANACONDA MOLYBDENUM PROJECT SITE

	% Ground Cover ($\bar{X}$)	Frequency (%) Shrub: $4m^2$ Quad Herb: $1m^2$ Quad	Shrub Density ($\bar{X}/4m^2$ Quad)	Shrub Density ($\bar{X}$/acre)	Shrub Ht. Range (m)
Grass (continued)					
Oryzopsis hymenoides	.26	18			
Stipa comata	.02	2			
Forb					
Astragalus lentiginosus	.04	2			
Gilia sp.	.12	20			
Lepidium densiflorum	.50	20			
Sphaeralcea sp.	.03	4			
Stanleya pinnata	.04	2			
Stephanomeria sp.	.11	8			
Litter	.20				
Total	25.16		4.52	1,144	

APPENDIX D

LIST OF PLANT SPECIES ENCOUNTERED ON THE ANACONDA MOLYBDENUM PROJECT SITE

Scientific Name	Common Name	Occurrence by Vegetation Type		
		Saltbush-Black Sagebrush	Galleta-Saltbush	Willow-Rush
Shrub				
Artemisia nova	black sagebrush	X		
Atriplex canescens	fourwing saltbush		X	
Atriplex confertifolia	shadscale	X	X	
Ceratoides lanata	common winterfat	X	X	
Chrysothamnus parryi	Parry rabbitbrush	X		
Chrysothamnus teretifolius	roundleaf rabbitbrush	X		
Chrysothamnus viscidiflorus	Douglas rabbitbrush	X		
Dalea polyadenia	Nevada dalea		X	
Ephedra nevadensis	Mormon tea	X	X	
Grayia spinosa	spiny hopsage	X	X	
Leptodactylon sp.	spiny gilia	X	X	
Opuntia echinocarpa	strawtop pricklypear	X		

APPENDIX D (continued)

LIST OF PLANT SPECIES ENCOUNTERED ON THE ANACONDA MOLYBDENUM PROJECT SITE

Scientific Name	Common Name	Occurrence by Vegetation Type		
		Saltbush-Black Sagebrush	Galleta-Saltbush	Willow-Rush
Shrub (continued)				
Salix exigua	red stem willow			X
Sarcobatus vermiculatus	black greasewood	X	X	
Sclerocactus polyancistrus	sclerocactus or fishhook cactus	X		
Symphoricarpos longiflorus	longflower snowberry	X		
Tetradymia axillaris	longspine horsebrush		X	
Tetradymia canescens	gray horsebrush	X	X	
Xanthocephalum sarothrae	broom snakeweed	X	X	
Grass and Grasslike				
Agrostis alba	redtop			X
Blepharidachne kingii	King desertgrass	X	X	
Bromus tectorum	cheatgrass brome	X	X	X
Carex nebrascensis	Nebraska sedge			X

APPENDIX D (continued)

LIST OF PLANT SPECIES ENCOUNTERED ON THE ANACONDA MOLYBDENUM PROJECT SITE

Scientific Name	Common Name	Occurrence by Vegetation Type		
		Saltbush-Black Sagebrush	Galleta-Saltbush	Willow-Rush
Grass and Grasslike (contineud)				
Distichlis spicata	inland saltgrass			X
Eleocharis macrostachya	common spikerush			X
Elymus triticoides	creeping wildrye			X
Hilaria jamesii	galleta	X	X	
Hordeum jubatum	foxtail barley			X
Juncus balticus	Baltic rush			X
Juncus mexicanus	rush			X
Muhlenbergia porteri	bush muhly		X	
Oryzopsis hymenoides	Indian ricegrass	X	X	
Poa sandbergii	Sandberg bluegrass	X		
Polypogon monspeliensis	rabbitfoot polypogon			X
Sitanion hystrix	squirreltail	X	X	

APPENDIX D (continued)

LIST OF PLANT SPECIES ENCOUNTERED ON THE ANACONDA MOLYBDENUM PROJECT SITE

Scientific Name	Common Name	Occurrence by Vegetation Type		
		Saltbush-Black Sagebrush	Galleta-Saltbush	Willow-Rush
Grass and Grasslike (continued)				
Sporobolus airoides	alkali sacaton			X
Sporobolus cryptandrus	sand dropseed		X	
Stipa comata	needle-and-thread	X	X	
Stipa speciosa	desert needlegrass	X	X	
Forb				
Alyssum alyssoides	pale alyssum	X		
Asclepias erosa	desert milkweed	X		
Astragalus lentiginosus	specklepod locoweed	X	X	
Atriplex sp. (annual)	saltbush			X
Bassia hyssopifolia	fivehook bassia			X
Brickellia sp.	brickellia	X		
Eriogonum densum	eriogonum	X		

APPENDIX D (continued)

LIST OF PLANT SPECIES ENCOUNTERED ON THE ANACONDA MOLYBDENUM PROJECT SITE

Scientific Name	Common Name	Occurrence by Vegetation Type		
		Saltbush-Black Sagebrush	Galleta-Saltbush	Willow-Rush
Forb (continued)				
Eriogonum inflatum	desert trumpet eriogonum	X	X	
Eriogonum shockleyi	Shockley wildbuckwheat	X		
Gilia sp.	gilia	X	X	
Halogeton glomeratus	halogeton	X		X
Iva axillaris	poverty sumpweed			X
Lepidium densiflorum	prairie pepperweed	X	X	
Kochia scoparia	summercypress			X
Lactuca serriola	prickly lettuce			X
Langloisia schottii	langloisia	X		
Lepidium montanum	mountain pepperweed	X		
Mentzelia sp.	Mentzelia	X	X	
Mimulus guttatus	common monkeyflower			X

APPENDIX D (continued)

LIST OF PLANT SPECIES ENCOUNTERED ON THE ANACONDA MOLYBDENUM PROJECT SITE

Scientific Name	Common Name	Occurrence by Vegetation Type		
		Saltbush-Black Sagebrush	Galleta-Saltbush	Willow-Rush
Forb (continued)				
Oenothera scapoidea	evening primrose	X		
Ranunculus cymbalaria	Rocky Mountain buttercup			X
Rumex crispus	curly dock			X
Sphaeralcea sp.	globemallow	X	X	
Stanleya pinnata	desert princesplume	X	X	
Stephanomeria sp.	wirelettuce		X	
Xanthium strumarium	cocklebur			X

APPENDIX E

LIST OF CANDIDATE THREATENED AND ENDANGERED PLANT SPECIES THAT OCCUR IN THE GENERAL PROJECT REGION BUT ARE NOT FOUND IN HABITAT TYPES AFFECTED BY THE NEVADA MOLY PROJECT

Species	General Habitat Description
Ascelepias toquimanus	Gravelly hillsides and benches, among pinyons and junipers; in stiff calcareous soils, often under low sagebrush; 7,000 feet on east slope of Toquimas Range, Nye County.[1]
Astragalus funereus	Clay ridges, gravelly hillsides; usually on limestone among sagebrush; on deep gravelly slopes, unstable soils.[2]
Cryptantha hoffmannii	Sandy loam at top of pass 5 miles west of Warm Springs; northeast exposure, 6,200 feet; with juniper, pinyon, and sagebrush; in diatomic soil 2 miles east of Basalt Mineral County.[3]
Draba arida	Rocky east slope of Toiyabe Dome; 10,500 feet; northwest slope of Toiyabe Dome; Bunker Hill, Lander County.[4]
Frasera pahutensis	Endemic to a limited area on Pahute Mesa, associated with pinyon pine and sagebrush.[5]
Lewisia maguirei	Loose, denuded soil from limestone, with pinyon-juniper-sagebrush; raw, gravelly clay slope in open pinyon-juniper country.[6]
Mertensia toiyabensis	Near wet place, with sagebrush, rose, and greasewood; canyons at north end of Toiyabe Range, near Austin; 7,800-8,600 feet.[2]
Penstemon pudicus	East side of Kawich Range, Nye County; near Eden Creek Mining Camp; steep mountain slopes, along washes and lower slopes; with sagebrush, pinyon-juniper, woodland border species.[7]

APPENDIX E (CONTINUED)

Species	General Habitat Description
Trifolium andersonii ssp. beatleyae	Flat rock outcrops around pinyon-juniper, Nye County Toquima Range; sparsely vegetated gravel, pinyon-juniper and big sagebrush cover; clay soil.[2]

[1]Barneby, R. C. 1964. Atlas of North American Astragalus. Volume I and II. Memoirs of the New York Botanical Garden, Volume 13. 1188 pp.
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CHAPTER 7

GLOSSARY

Animal Unit (AU) -- Used in calculating relative grazing impact of different kinds and classes of domestic livestock and common wildlife species. One animal unit is defined as one mature cow of approximately 1,000 pounds and a calf as old as 6 months, or their equivalent.

Animal Unit Month (AUM) -- The amount of forage required by an animal for one month.

CHAPTER 8

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